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ABSTRACT

A study was conducted to identify, describe, and analyze the visual displays accompanying instructional texts in basal reading series. Specifically, the study reviewed 1,884 displays from the student textbooks, major workbooks, and teachers' editions of six series used from grades four through eight to answer (1) descriptive questions about the location, original data source, specific knowledge domains, types, and formats of the displays; and (2) instructional questions about the purposes for completing a visual display task, the number and types of questions about displays given to students, whether instruction was provided along with the displays, whether characteristics of displays were taught, and whether enrichment activities were offered. The results suggest that while visual displays can be used to enhance higher order comprehension tasks, they most often do not in basal texts. Visual displays were more likely to be used for drill and practice or with specialized skills sections in students' workbooks. There was a paucity of higher level questions that required students to interpret and evaluate displays. (FL)

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Investigating Visual Displays in Basal Reading Textbooks

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Outline for Investigating Visual Displays in Basal Readers

Introduction

- Rationale:

Increasing graphics/visual displays in texts research to determine their effects on comprehension data base needed describing how visual displays used in instructional materials.

- Purpose:

To identify, describe and analyze visual displays in Basals 6 major basal series on 2 school levels (Int. Grades 4-6) and Junior High (grades 7-8)

Study Design Description

- Research Questions: Macro-Level Quantitative Analysis

Divided into two broad question types: description/instruction

- Description

Location, origin, specific domain, types, format

- Instruction

Purposes, number and types of questions about visual displays instruction provided, characteristics of visual displays taught, enrichment activities

- Research Question Micro Level Qualitative Analysis

- Definition of Visual Display

- Definition/Description of types of visual displays used

Sequential, Quantitative, Textual Surrogates, Tables/Charts

Procedure

1884 visual displays in student textbook, major workbook and teacher's edition (5 grades, 6 publishers, 4 locations)

- Unit of analysis

- Descriptive Questions Description

- Instructional Question Description

- Definition and examples of the 5 question categories
(Extracting, Comparing, Manipulating, Interpreting, Evaluating)

- Enrichment activities description

- Data Analysis

Description Analysis: Frequencies, Crosstabulation

Statistical Analysis: Analysis of variance, breakdowns

- Interrater Reliability

Results

- Descriptive Findings: Location
 Visual Displays/Visual Display Questions
- Descriptive Findings: Publisher
 Visual Displays/Visual Display Questions
- Descriptive Findings: Publisher and school level
 Visual Displays/Visual Display Questions
- Descriptive Findings: Location, Publisher, and School Level
- Statistical Findings for 6 ANOVAs (Total Questions, Extracting, Comparing, Manipulating, Interpreting, Evaluating)
 Main effects: Questions
 Main effects: Enrichment Activities
 Interaction for Questions
- Overview of Question Findings/Discussion
 Location - In depth
 Publisher - In depth

Conclusion

- Patterns
 Wedding rings
 Crazy quilts
- Puzzles
 Comprehension is study skill
 Text Selection vs Skills Lesson Workbook
 (Contextualized vs Decontextualized)
 Prior Knowledge - content - conventions
 Producing visual displays
 Developmental - Learning Styles - Metacognition
- Potentials
 More descriptive studies - content areas - writing
 More experimental studies - Qualitative/Naturalistic studies

INTRODUCTION

Today I would like to report on just a piece of a larger study we did on visual displays. First, I'll present the big picture for the total number of visual displays and then highlight some of the interesting findings for the locations of the visual displays and the number of certain kinds of questions that accompany the visual displays for 6 publishers and two school levels, intermediate and junior high. But first some information on the background, context, and purpose of the study.

The study of the use and effects of visual displays of information in text is still in its infancy; even though recent advances in computer graphics have made the use of visual displays widespread. The fact that visual displays frequently accompany the information in newspapers, magazines, textbooks and encyclopedias, and the volume of exercises on graphical comprehension in school materials are proof of the intuitive belief that such devices are useful. But a review of the literature shows that we know little about the specific effects that graphic presentations have on comprehending text. Because of the ever-increasing use of graphic aids in texts, we need empirical research to determine the effect of graphic aids on comprehension. Before we can do this, however, we need to establish a data base describing how visual displays are used in instructional materials.

Our study describes a data base which was developed so that later research for determining the effect of visual displays on reading comprehension and interest can be facilitated. The purpose of this research was to identify, describe and analyze the visual displays accompanying instructional texts as they occur within a predominant medium of reading instruction--the basal reading series. The study examined visual displays in six major basal series on two school levels: intermediate (grades 4-6) and junior high (grades 7-8).

STUDY DESIGN

Questions regarding visual displays in basal reading textbooks were divided into two broad question types - description and instruction. Description questions asked about the location, original data source, specific knowledge domains, types, and format. Instructional questions asked about purposes for completing a visual display task, number and types of questions about visual displays given to students, whether or not instruction was provided along with the visual, instructional purposes, whether characteristics of visual displays were taught, and whether guided practice, and enrichment activities were offered. These questions attempted to discover the answers to "what is available in basal reading texts concerning visual displays?"

Besides this macro level quantitative analysis, we also performed a micro level qualitative analysis of visual displays. We selected one publisher and one kind of visual display (charts and tables) at grade 4 and grade 7 for an in depth look at instruction. A sub study then compared a second publisher's instruction of charts and tables at grade 7. Our goal was to better understand patterns of instruction as exemplified by charts/tables.

Based upon these concerns, we asked the following questions in our research:

I. Descriptive Questions

1. Where do publishers place visual displays?
2. From what data sources do publishers derive visual displays?
3. From what specific knowledge domains do publishers derive visual displays?
4. What kinds of visual displays do publishers present to students?
5. Format Evaluation: Questions asked about each visual display.

- a. Is the display sufficiently complete to allow a student to complete the task required?
- b. How clearly is the information presented?
- c. Is there sufficient precision in the underlying numerical scale to allow a student to infer specific numbers? (That is, are there visual displays activities which require precision when they allow only for approximation?)
- d. How appropriate is the visual display for the maturity level of the intended audience?

II. Instructional Questions

6. What purposes do publishers suggest/implly for having students complete visual display activities?
7. What kinds of questions accompany visual displays?
8. How many of each kind do publishers ask?
9. Are there any enrichment activities to accompany the visual display lesson?
10. What is the nature of the instruction provided for the visual displays?

What is the instructional purpose of the visual display? Does the instruction bring attention to the characteristics, terminology, and relevance of the visual display? Is there evidence of guided practice?

For the purposes of our presentation, visual displays will be defined as aids which clarify, simplify, summarize, overview, and bring life to prose. Following is a description of the types of the visual displays analyzed for the purposes of the research:

A sequential graph is a lineal, temporal form of organization. Examples of sequential graphs are simple and multiple timelines, flow charts,

hierarchical-organizational charts, genealogical charts, process charts, and sports tournament charts.

Quantitative graphs facilitate the comparison of areas, quantities, numerical values, and other quantitative data. They often clarify important facts, generalizations and relationships which are not readily apparent in tabular data. Included under this category are line, bar, pie, and pictographs.

Textual surrogates are schematic diagrams, illustrated directions, cross-section diagrams (profiles) and directional diagrams. Included also in this category are symbols used for traffic, music, mathematics, language (such as the hand symbols for ASL), and ideographs for written language.

Tables and charts are combined into one category. Tables are an orderly arrangement of concrete numerical information in vertical columns and horizontal rows. Examples include time management schedules, transportation schedules, air distance tables and mileage tables. A chart shows organization through words, symbols, and/or numbers. The last category includes those visual displays which are highly verbal in appearance. Included are verbal charts necessary for business--sales ads, classified ads; for library skills--dictionary pages, indices, tables of contents, glossaries, encyclopedias, title-author-subject cards; and for survival skills--phone books, movie and television schedules, etc.

PROCEDURE

A total of 1884 visual display entries were encountered as we examined the student textbook, major workbook, and teachers' edition across five grades, 4th through 8th. Each visual display was recorded as a separate entry, even though accompanying instructions or questions might be shared between two entries.

Unit of Analysis

In a study of this type, there are no subjects, as such, to use as the basic unit of analysis, but we conceptualized each visual display as a "subject" and the basic unit of analysis for both statistical and qualitative analyses. The quantitative analyses also include instruction information given to teachers in the Teachers' Edition of the basal.

I. Descriptive Questions

1. Locations were described as "in the student's text as a skills lesson" (decontextualized), "in the student's text as a narrative or expository selection" (contextualized), in the teacher's edition only (as an introduction, demonstration, or explanation), or in a main workbook. The page number of the page containing the visual display was recorded regardless of whether the visual display was located in the text, teacher's edition, or major workbook.
2. The content was described globally in terms of its orientation and source of data: that is if it dealt with current factual knowledge, historical factual knowledge (more than ten years ago), knowledge based on realistic fiction (there was no evidence that the facts were genuine) and upon fantasy (no evidence of factual authenticity).
3. A content analysis was made of a sampling of visual displays and it was decided that the knowledge domains of the visual displays were similar to those covered by the Dewey Decimal System. Therefore, a similar system of categorization was used (see Appendix A).
4. The genre or type of visual display was categorized according to format. The design of the instrument was based somewhat on Fry's Taxonomy of Graphs (1981), although changes occur in category labels:

Fry's "lineal" graphs become "sequential" graphs and his "pictorial" graphs become "text surrogate" in this research; in organization: Fry's "hypothetical" becomes "test surrogate"

5. We evaluated each visual display in terms of completeness, legibility, intention, and appropriateness. A second opinion was sought -- judgments were substantiated with an additional analysis by two colleagues. The graph was judged to be incomplete if the omission or misplacement of information rendered the questions about the graph difficult to answer. A cluttered or obscure graph contained information that distracted or interfered with question-answering because there was too much unnecessary information, the coloring inappropriate so as to distract or the print was unnecessarily large or small. Also a graph was considered confusing if the symbols were not clearly differentiated from each other. A third critique was the fact that some graphs required precise answers from the reader, but the data itself was not presented precisely so that the reader would have to estimate an answer. A final critique was the inappropriateness to grade level of a visual display; for example, if a lesson on career awareness was to be undertaken, then it is logical that the materials be mature in tone.

II. Instructional Questions

6. We categorized the purpose for including the visual display in the text. If its purpose was to aid the reader in visualizing or imagining information, then there were no real accompanying questions about the visual display, and the text may or may not have referred directly to it. If its purpose was to aid the reader to extract information then there were specific accompanying questions so that the reader might use

the information in the visual display to answer separate questions. The student might be asked to fill in information in a partially completed visual display, or s/he might be asked to criticize the visual display in terms of its accuracy or its presentation. Finally a visual display might be provided solely for the purposes of assessment.

7. The kinds of questions which accompany the visual display were then categorized in terms of their requirements on the part of the reader. An extracting data question asked the reader to use the information from the visual display to answer a question which doesn't require the reader to compare the data with other pieces of data. A comparing question requires the reader to use two or more pieces of information to answer a question in a visual display. A manipulative question requires the reader to actually perform a mathemagenic computation in order to answer the question. An interpreting question requires the reader to utilize several pieces of information to make a prediction, notice a trend, or justify a condition. An evaluative question requires the reader to summarize the effectiveness of the graph in terms of its purpose, accuracy, and the skills needed by the reader to understand the graph. We asked about the number of each kind of question that accompanied visual displays.
8. We then observed the nature of the instruction. We judged the existence, degree, and type of instruction which accompanied the visual display. We decided whether instruction had occurred: we asked whether the instruction mentioned the characteristics of the visual display (in terms of appearance, purpose for or use of the visual display), and/or the specialized terminology connected with the visual

display (such as identifying labels). Third, we sought evidence of guided practice (where the teacher actually "walks through" the lesson with the students, relating the exercise to real-life situations. We also investigated the extent to which enrichment activities were included for visual displays.

Description of the Question/Task Categories

We categorized the kinds of questions or tasks which accompany the visual display in terms of what they required students to do. We developed 5 categories of questions: Extracting, Comparing, Manipulating, Interpreting, and Evaluating. The following definitions and examples from Publisher F for grade 4 and grade 7 should help clarify the criteria used to categorize the questions.

1. An Extracting question requires the reader to look at one piece of data. If a student can answer a question by looking at the legend and looking at one category on a visual display, for instance, it is an Extracting data question.
Example: How much water would you use to make two servings of rice?
2. A Comparing question requires the reader to use two or more pieces of data to answer a question asking for similarities, differences, or analysis. If a student can answer a question by looking at and comparing two numbers, for instance, it is a comparing question.
Example: During what two months are temperatures lowest in Cairo?
3. A Manipulating question requires the reader to perform a computation in order to answer the question.
Example: How much less was spent in 1979 than was spent in 1980? (the student must compare 2 numbers to subtract.)

4. An Interpreting question requires the reader to use several pieces of information to make a prediction, identify a trend or patterns, justify a condition, or draw conclusions.

Example: How will the Big Dipper change from now until 100,000 years from now?

5. An Evaluating question requires the reader to judge the effectiveness of the visual display in terms of its purpose, accuracy and the skills needed by the reader to understand the visual display.

Example: Write two sets of directions for finding the pirate treasure...give your partner a direct and easy route to follow.
Give the other person a more difficult route.

For the purpose of the analysis, we considered Extracting questions to be on a literal, lower level of difficulty, Comparing and Manipulating questions to be on a higher level of difficulty, and Interpreting and Evaluating questions to be on the highest level of difficulty. However, we realize that level of difficulty is often a function of the reader's prior knowledge of subject matter and characteristics of the visual display, the clarity of the question, the quality of the visual display, and the judgment of the person categorizing the questions. But, other things being equal, we hypothesized such an order of difficulty.

Description of Enrichment Activities

Enrichment Activities are follow-up, supplementary tasks for visual displays. They may be oral or written tasks, and teacher or student generated. Teachers are sometimes instructed by the teachers' manual to reproduce the visual display on the blackboard and/or to identify and describe the visual display from the textbook(s). Sometimes the teachers' edition suggests how the

teacher should elicit responses, but all visual displays are produced by the student. Students sometimes perform enrichment activities as an individual or as a member of a group. For this analysis all types of enrichment activities were collapsed into one category.

Data Analysis

Descriptive Analysis. Frequency and cross tabulation analyses were used for the descriptive questions concerning visual displays (location, sources, specific domains, kinds of visual displays, and format). Breakdown analyses were used for the instructing questions (location, number of questions) of each type accompanying visual displays, and enrichment activities).

Statistical Analysis. For statistical analysis, we performed analysis of variance for each of the 5 question types and their combined total, making a total of 6 separate ANOVAS: Extracting, Comparing, Manipulating, Interpreting, Evaluating, and Total Questions. The 3 factors for each ANOVA were Publisher (6 levels: A,B,C,D,E,F), Location in the basal reading materials (4 levels: Skills Lessons in the student text, Text Selections, both narrative and expository, in the student text, Teachers' Edition, and Workbooks) and School Level (2 levels: Intermediate (grades 4-6) and Junior High (grades 7-8). The dependent measure was the number of questions in each category for each visual display.

The design for the enrichment activities was a 2 way analysis of variance: Publisher (same 6 levels) by School Level (Intermediate vs. Junior High).

Interrator Reliability

A check for interrator agreement was carried out for each category based on the criteria we established for the definition. The two coders selected a random sample of 10 percent of the entries for each question category and enrichment activity and then judged each entry independently. The number of

agreements divided by the number of disagreements yielded an interrater agreement of 85% for the combined question types and 90% for the enrichment activities. But, other things being equal, we hypothesized such an order of difficulty.

RESULTS

Descriptive Findings: Location

Visual Displays. We can see from Figure 1A and Table 1A that when we collapse across publishers and school level, about three-fourths of the approximately 2000 visual displays (N=188) are located in basal materials for the student (74%) and about one-fourth are located in the Teachers' Edition (26%). Of the student materials, most visual displays are located in the major workbook (37%) with the remainder divided rather unevenly between skills lessons and text selections. Note that twice as many visual displays are found in skills lessons (23%) as are found in the text selection (13%). It is also noteworthy that 460 of the 1884 visual displays (23%) are found in teachers' editions which typically suggest that teachers reproduce them on the chalkboard (or from a master) so that students may or may not see them.

Visual Display Questions. A similar pattern exists for the questions accompanying visual displays. Three fourths of questions are located in student materials (73%) and one fourth in the teachers' edition (27%). Most of the questions are found in the major workbook (47%) -- almost half of the questions --, the fewest are found in the text selection (3%), and about one fourth are found in the skills lessons. As you can see from Figure 1B and Table 1B however, there is a larger percentage of the total questions located in the major workbook (47%) than is the case for the percentage of visual displays (37%) and a smaller percentage of questions located in the text selection (13%) than is true for visual displays (3%).

Descriptive Findings: Publisher and School Level

Visual Displays: Figure 4A indicates that 5 of the 6 publishers look quite similar concerning their percentage of the total visual displays investigated (N= 1884). Publisher D accounted for almost one fourth of total (23%) while the rest ranged from 14% to 16%.

Visual Display Questions. Figure 4B shows that a different pattern emerges for the total questions accompanying those visual displays. Publisher D still accounts for about one fourth of the questions (26%), but Publisher F, for instance, accounted for only 10% of the total questions vs. 16% of the total visual displays, while Publisher E accounted for 22% of the total questions vs. only 16% of the total visual displays, a 6% difference for Each. Publisher C had a larger percentage of questions than visual display (21% vs. 16%) while Publishers A and B had smaller percentages of questions than visual displays (12% vs. 14% and 9% vs. 15%). The analyses show that there is not always a match between the number and percentage of visual displays and the instruction (in the form of questions) that is provided for the visual displays for the six publishers. Some publishers provide fewer visual displays but a great deal of instruction for them while others provide more visual displays but little/or no instructions/questions for them.

Descriptive Findings: Publisher and School Level

Visual Displays. As is indicated in Figure 6A, except for Publisher D (14%), there is little difference between publishers on the intermediate level (Publishers A and F = 8% each and Publishers B, C, and E = 9% each). The same is true for the junior high level (Publisher A=6%, Publishers B and E = 7%, Publishers C and F = 8%, and Publisher D = 9%). The 5% difference for Publisher D between intermediate and junior high shows that more emphasis is placed at the

intermediate level in comparison to the other publishers and in comparison to the junior high level within publishers.

Visual Display Questions. Figure 6B shows that there is more variation among publishers for both school levels for the percentage of total questions in comparison to the number of visual displays. Publisher D leads with the highest percentage 16%, followed by Publishers C and E at 11% and Publishers A, B and F at 6% on the intermediate level. On the junior high level, Publishers C, D, and E each account for 10%, Publisher A for 5%, Publisher D, 4% and Publisher B at 3%. It is interesting that the percentage is higher for questions than for visual displays for Publishers C, D, and E but lower for Publishers A, B, and F. This seems to indicate that more instruction is provided for visual displays by Publishers C, D, and E.

Descriptive Findings for Location, Publisher, and School Level

Visual Displays. Table 2A shows that collapsed across publishers, 72% of the visual displays on the Intermediate level are located in student materials while 76% on the Junior High level are located in student materials. This amounts to a slight increase for student materials and a decrease for teachers' edition as locations for visual displays on the Junior High level. The biggest difference for school levels is the percentage for visual displays found in the skills lesson location. Only 19% of the visual displays on the intermediate level are found in skills lessons while 29% are found in skills lessons on the junior high level, an increase of 10%. There are slight decreases in the percentages for the text selection (2%) and major workbook locations (3%) for junior high. When we look at individual publishers, however, we see a great deal of variation for location for intermediate and junior high levels. Publisher D accounted for 25% of the 1060 visual displays on the intermediate level and 20% of the 824 on the junior high level, indicating a 5% decrease at the junior high level while

Publisher F accounted for 14% of the total intermediate visual displays but 18% of the total junior high visual displays, a 4% increase at the junior high level. Looking at the specific locations, we see that publishers differ in what they do for the intermediate and junior high levels. Of the visual displays found in the major workbook locations, on intermediate and junior high levels, Publisher D accounts for 19% on each level. Publisher D, however, accounts for 32% on the intermediate level (about one third) and 29% on the junior high level while Publisher E accounts for only 12% on the intermediate level and only 9% on the junior high level. Publisher D has 20% of all the visual displays at the intermediate level in contrast to 1% at the junior high level, a difference of 19%. Publisher F has 14% of the intermediate level visual displays, but 24% of the junior high level visual displays, a difference of 10%. For the skills lesson, Publisher C has a 4% decrease from the intermediate to the junior high level while Publisher F has a 4% increase from the intermediate to the junior high level. The same situation exists for the text selection location. Publisher E has an 11% decrease from intermediate to junior high levels while Publisher F has an 8% increase from intermediate to junior high levels. The same variation exists within publishers for both visual displays and questions accompanying visual displays. Publisher F has a total of 302 visual displays but only 209 visual display questions. Of the 302 visual displays for the major workbook location, 18% are on the intermediate level and 11% on the junior high level. Of the 209 visual display questions, 35% are on the intermediate level and 28% on the junior high level. For the teachers' edition location, 14% of the visual displays are on the intermediate level and 16% on the junior high level, while 6% of the visual display questions are at the intermediate level and less than 1% at the junior high level.

Clearly, publishers have quite different philosophies about where to put visual displays and questions accompanying visual displays for each school level. This is true between publishers and among publishers.

STATISTICAL FINDINGS

We have grouped together the statistical findings for the 6 separate ANOVAS performed for Total Questions, Extracting, Comparing, Manipulating, Interpreting, and Evaluating questions. The analyses revealed significant main effects for Publisher and Location and significant 2-way interactions for 1) Publisher and Location, 2) Publisher and School Level, and a significant 3-way interaction for 3) Publisher and Location and School Level. The ANOVA for Enrichment Activities revealed a significant main effect for Publisher, but no significant interactions. These data are displayed in Tables 2B, 3B, and 18.

Main Effects For Questions/Tasks

Because significant interactions were present for all three factors (Publisher, Location, School Level), it is difficult to interpret the findings for main effects. The data indicates that there are indeed, significant differences for Publisher and Location but we must remember the dependencies and interactions among all three factors.

The ANOVAs resulted in 4 significant main effects for Location (Total Questions, Extracting, Comparing, $p=.001$ and Evaluating, $p=.020$) and Publisher (Total Questions, Extracting, Manipulating, and Evaluating, $p = .001$, and Comparing, $p = .011$).

Main Effects For Enrichment Activities

We found significant main effects for Publisher ($p = .001$). These data can be seen on Tables 17 and 19. What is most striking is the low mean number of Enrichment Activities for Publishers and School Levels.

Interactions For Questions/Tasks

The ANOVAs resulted in 9 significant interactions. For Total Questions we found 2 way interactions for Publisher and School Level, Publisher and Location, and School Level and Location ($p = .001$). In addition there were 2 way Publisher and School Level interactions for Extracting Questions ($p = .015$) and Interpreting ($p = .02$) and Publisher and Location interactions for Extracting ($p = .001$), Manipulating ($p = .009$) and Evaluating ($p = .02$). The data for the 2 way interactions are displayed in Tables 13-15. Table 16 shows that we found a significant 3 way interaction (Publisher x Location x School Level) for Total Questions ($p = .001$).

Summary of Question/Task Findings

It is clear from the data that there are indeed significant differences with respect to the number and kinds of questions/tasks that students are asked to complete when they use data from visual displays as a function of publisher location in basal materials, and school level. There does appear to be patterns that hold up across publishers, locations and school levels. We know that publishers ask students more Extracting and Comparing questions than Interpreting, Evaluating or Manipulating questions. A second pattern is (a) the most preferred location for questions/tasks accompanying visual display is the Workbook followed by (b) the Teachers' Edition as the next preferred location. The least preferred location is (c) the Text Selection location. The third pattern indicates that more differences exist between publishers at the Intermediate than at the Junior High level in both location and question total. For Total Questions, Publishers A, D, E, and F look rather similar while Publisher C (who asked the most questions) and Publisher B (who asked the fewest questions) looked quite different.

However, there seem to be few reliable patterns when we look closely at publisher behaviors (both within and between) at Intermediate and Junior High

levels and at the various locations for the 5 specific question categories, Publisher C vs. Publisher B. This fact, no doubt, explains why we found a significant 3 way interaction. In general, there seem to be as many inconsistencies as there are consistencies and as many questions are raised as are answered about questions/tasks accompanying visual displays.

Location. As we see from Table 3B, there were significant main effects for 4 of the 6 question types (Total Questions, Extracting, and Comparing, $p = .001$ and Evaluating, $p = .02$). The data shows that publishers place questions accompanying visual displays most often in workbooks (8.51), followed in descending order by the Teachers' Edition (6.03), Skills Lesson and Text Selection locations, (4.24 and 4.21). If Skills Lessons and Text Selection are combined, students see about the same number of visual display questions in their student text as they do in their workbooks. It is interesting that so few questions accompany visual displays that are related to the narrative and expositive basal selections. The tendency seems to be to ask questions about visual displays in Skills Lessons or Workbooks that are decontextualized and unconnected to specific text selections. It is also clear that many visual display questions appear only in the Teachers' Edition and are not in the student text. We can wonder whether students are missing an opportunity to answer many of these visual display questions if teachers choose not to use them; we also wonder if students believe visual display questions in workbooks are less important, more trivial than those in their basal text or the Teachers' Edition.

Student perception of the importance of visual displays/questions as a function of location for Total Questions showed that in the Text Selection location, 3 publishers asked no questions (A, C, and F) while 3 publishers asked some (B, D, and E). This was the least popular location to place visual display

questions. The Teachers' Edition was the second most popular location and the Skills Lesson the third most popular location. The Intermediate level tends to have more visual display questions in the Teacher's Edition than does the Junior High (6.99 vs. 4.88) while the Junior High level tends to have more visual display questions in the Workbook than does the Intermediate level (8.78 vs. 7.58). Similar patterns exist at both Intermediate and Junior High levels for the Skills Lesson (Intermediate = 4.31 and Junior High 4.17) and Test Selection (Intermediate 4.22 and 4.56).

Table 4B reveals that Publisher C emphasizes the major workbook and Teachers' Edition as locations for question, de-emphasizes Skills Lessons and ignores the Text Selection locations. The intermediate level is preferred over the junior high level for questions, appearing only in the Teachers' Edition while for Workbook questions, the opposite holds true. Publisher F has a different pattern with about half as many workbook questions and Teachers' Edition questions as Publisher C for a stronger emphasis on Skills Lesson location and weaker emphasis on the Teachers' Edition than Publisher C.

For Extracting Questions, Table 4B indicates that at the Skills Lesson location, Publisher D asks the most at the Intermediate level (5.49) while Publisher B asks the fewest at the Intermediate level (2.70). Publisher E asks the most questions at the Junior High level (5.46) and Publisher C asks the fewest questions (1.64). At the Text Selection location 3 publishers ask none (A, C, F). Publisher E asks the most questions at the Intermediate level (5.00) but asks none at the Junior High level, and Publishers D and B ask slightly more questions at the Junior High than at the Intermediate level (B = 2.00; 3.00 and D = 4.50; 4.88). At the Teachers' Edition location, 4 publishers have more questions at the Intermediate than Junior High level (C, D, E, and F) while A has more questions at the Junior High level than the Intermediate (2.90, 4.50).

Publisher D emphasizes Skills Lesson and Text Selection locations more than does Publisher C who prefers the Teachers' Edition and Workbook locations. Both ask more questions at the intermediate level than the junior high level.

The Comparing ANOVA results were similar to those for the Extracting category. The least popular location was Text Selection (Publishers A, C, and F had none at all) but there was the most variation here. The Workbook is the most popular location for all publishers for Comparing questions and the second most popular location varies: Publishers A, B, and C prefer the Teachers' Edition, Publisher E prefers the Text Selection location and Publishers D and F prefer the Skills Lesson location. Five publishers (B, C, D, E, F) place more visual display questions at the Skills Lesson location for the Intermediate level than Junior High. At Text Selection, Publisher B asked no questions at the Junior High level but Publisher D asked twice as many (4.00 vs. 2.10) and Publisher E asked three times as many (10.00 vs. 3.00) on the Junior High level as on the Intermediate level. At the Workbook location, all but Publisher F ask more at the Junior High than the Intermediate level. Except for Publisher C and D, the publishers have similar patterns.

For the Evaluating question category, the Publisher and Location interaction was significant ($p = .02$). Overall, Publisher C asks the most Evaluating questions (4.11) and Publisher E the fewest (1.34). The remaining publishers ask about the same amount of questions. For the Skills Lesson location, Publishers B, E, and F look alike for both School Levels (2.08, 1.75; 1.67, 1.67; 1.00, 1.00). Publisher A and C ask none at the Junior High level, Publisher A asks the most at the Intermediate level (3.25) and Publisher D asks the most at the Junior High level (2.00). For Text Selection, Publishers A, C, and F have none at all, Publisher B has questions only for Junior High while Publisher E has them only at the Intermediate level. For Teachers' Edition

Publisher C asks the most for Intermediate level (5.00) and Publisher E the fewest (1.13). Publishers C and D ask more for Intermediate than for Junior High levels and Publisher A and B have none for Junior High and Publisher F has none for either level. All publishers have some Evaluative questions in the Workbook location. Publisher B asks the most questions (5.67 for Intermediate and 4.29 for Junior High). Publishers B and D ask more for the Intermediate level while Publishers C and F ask more for the Junior High level. Publishers tend not to put evaluating questions in the Skills Lessons or Text Selection location but rather put them in the Teachers' Edition or Workbook locations.

Publisher. Table 2B reveals that there were significant main effects for all question types (Total Questions, Extracting, Comparing, Manipulating, and Evaluating, $p=.001$) except Interpreting. In general, publishers did not ask many of the higher level Interpreting questions. We can see from Table 1B that overall, publishers averaged about 6 questions per page for each visual display; however, there were differences among publishers. The rank order for the average number of question accompanying visual displays from the most to the least is Publisher C (8.86) Publisher D (7.08) Publisher A (6.43) Publisher E (5.97) Publisher F (5.37) Publisher B (4.81). Publisher C asked twice as many questions as Publisher B. Publishers A, D, E, and F look very much for the total number of questions per page asked about all visual displays. As is clear from Table 4B, there is a great deal of variation within, as well as between publishers, depending on the type of question/task accompanying the visual display, its location in the basal materials, and the school level (Intermediate or Junior High).

If we rank order the 5 question types from the most asked to the least asked for all publishers and across locations and school level, we find in descending order Extracting (4.84) Comparing (4.22) Interpreting (2.58)

Evaluating (2.54) Manipulating (2.10). There is a great deal of consistency between publishers for Extracting and Comparing questions (many questions accompanying the visual displays) and for Interpreting, Evaluating, and Manipulating questions (few questions accompanying the visual displays). It may be that publishers ask few manipulating questions because they assume students will get opportunities to do manipulative tasks for visual displays in mathematics lessons. It is not clear why publishers ask for few of the higher-level Interpretive and Evaluative questions, even though these require critical thinking, strategies for high level processing, and prior knowledge of subject matter and visual display characteristics.

For the Total Question category, half of the publishers asked more visual display questions on the Intermediate level than on the Junior High level: C (9.95, 7.81), E (6.71, 5.88), B (4.97, 4.63) while the remaining 3 publishers asked more on the Junior High level than on the Intermediate level: A (7.68, 6.48), D (7.49, 7.23), and F (6.29, 5.55). Across School Levels, all publishers prefer the Workbook location for their visual display questions.

For the Extracting question category, Publisher C asks more at the Intermediate level than the Junior High level (6.7; 4.6) while the reverse is true for Publisher A (4.5; 5.9). Publisher F is similar to Publisher A and Publisher E is similar to Publisher C in their preference for Intermediate or Junior High levels while Publishers D and B have approximately equal numbers of questions for each level.

For the Comparing question category we find a pattern similar to the Extracting question category: Publisher C asks the most questions (5.20) and Publisher B the fewest (3.53) and the rest look rather alike (A = 3.66, D = 4.51, E = 3.71, and F = 4.13).

The Manipulating question category like the Comparing category had only a Publisher \times Location interaction that was significant ($p = .009$). For this category, Publisher A asked the most questions (3.30) and again Publisher B asks the fewest (1.09). Publishers C and F have similar patterns (2.78, 2.70) and Publishers D and E (1.81, 1.88). When we look at publishers and locations, we see a crazy quilt. There seems to be no patterns for publishers at the different locations. Skills Lesson is the most preferred location for Publishers E and F and least preferred for Publisher C. Only Publishers B and D ask any questions for Text Selection and Teachers' Edition locations and the Workbook location is most preferred by Publisher a and least preferred by Publisher B. Publishers vary according to School Level and Location since Publisher F asks more questions for Intermediate level for the Workbook location than for Junior High, but the opposite is true for Publisher C. However, Publisher F asks more questions at the Junior High level than at the Intermediate level for the Skills Lesson location while the reverse is true for Publisher D.

For the Interpreting question category, there was a significant Publisher \times School Level interaction ($p = .04$). Two publishers asked more questions at the Junior High than at the Intermediate level ($E = 1.69, 2.55, F = 2.23, 3.68$), two publishers asked more at the Intermediate level ($C = 4.83, 2.14; B = 2.33, 1.00$), and two publishers asked about the same for both levels ($A = 2.31, 2.17; D = 1.67, 1.00$). The average overall for Interpreting questions was 2.58 with Publisher C asking the most (3.38) and Publisher D the fewest (1.33). Publisher A prefers to place Interpreting questions in the Workbook, Publishers B and E in the Skills Lesson, Publishers C and D in the Teachers' Edition and Publisher F in the Text Selection location. Publisher B uses Text Selection only for the Junior High level (1.00) but Publisher F uses it only for the Intermediate level

(4.00). It is interesting that Publisher F uses the Skills Lesson and Workbook locations for more questions at the Junior High level than Intermediate level, and has none in the Teachers' Edition.

School Level. There were no significant main effects for School Level, but we cannot conclude that there were no differences within and between publishers and locations for all 5 question types and total questions as is clear from Tables 5-10. For instance, within publishers, differences between the Intermediate and Junior High levels exist: Publisher C (Intermediate = 9.81, Junior High = 7.81) had a difference of 2.00 in the average number of visual display questions per page for Total Questions and a 2.66 difference for Interpreting questions (4.80 vs. 2.14) while Publisher A (Intermediate = 5.29, Junior High = 7.79) had a difference of 2.50. Publishers did not seem to vary much in the number of Manipulative questions asked at Intermediate and Junior High levels. At the Intermediate level Publisher C asked over twice as many total questions (9.81) as did Publisher B (4.86), a difference of 4.95. At the Junior High level, Publisher A averaged 7.79 total questions while Publisher B averaged 4.73, a difference of 3.05 questions. Similar patterns of differences exist for the 5 specific question types.

Although there were few differences within locations as a function of School Level for Extracting questions, there were large differences for the remaining question types.

Patterns of differences and inconsistencies exist between locations. For instance, at the Intermediate level, we find an average of 7.58 total questions for the Workbook location, but only 4.31 for the Skills Lesson location, a difference of 3.27 questions. At the Junior High level we find 8.78 but only 4.17 for the Skills Lesson, a difference of 4.61 questions. Similar patterns of differences exist for the other question types. We can conclude, therefore,

that while there were no significant main effects for School Level, when we tease apart what publishers do at different locations for different question types, there are definite differences between the Intermediate and Junior High levels.

CONCLUSIONS

Visual displays lend themselves quite conveniently to higher order comprehension tasks. Indeed, the whole point of displaying information visually is to highlight relationships among facts that might be more obscure in a verbal presentation. Therefore, it would seem likely, that visual displays frequent the exposition or "natural text" in the basals. This is not the case, as we have suggested. Visual displays are more likely to be used for drill and practice or for specialized skills sections in the pupils' textbooks. We are concerned that students may not be exposed to the kinds of displays which are most effective in highlighting exposition. We even more concerned about the paucity of higher level kinds of questions which require students to interpret and evaluate the displays. Therefore, we hope that decisions about the design of better textbooks are sound ones and are based upon research more than upon intuition.

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I. Descriptive Questions

1. Where do publishers place visual displays?
2. From what data sources do publishers derive visual displays?
3. From what specific knowledge domains do publishers derive visual displays?
4. What kinds of visual displays do publishers present to students?

5. Format Evaluation: Questions asked about each visual display.

- a. Is the display sufficiently complete to allow a student to complete the task required?
- b. How clearly is the information presented?
- c. Is there sufficient precision in the underlying numerical scale to allow a student to infer specific numbers? (That is, are there visual displays activities which require precision when they allow only for approximation?)
- d. How appropriate is the visual display for the maturity level of the intended audience?

II. Instructional Questions

6. What purposes do publishers suggest/implly for having students complete visual display activities?
7. What kinds of questions accompany visual displays?
8. How many of each kind do publishers ask?
9. Are there any enrichment activities to accompany the visual display lesson?
10. What is the nature of the instruction provided for the visual displays?

What is the instructional purpose of the visual display? Does the instruction bring attention to the characteristics, terminology, and relevance of the visual display? Is there evidence of guided practice?

FIGURE 1A
LOCATION OF VISUAL DISPLAYS

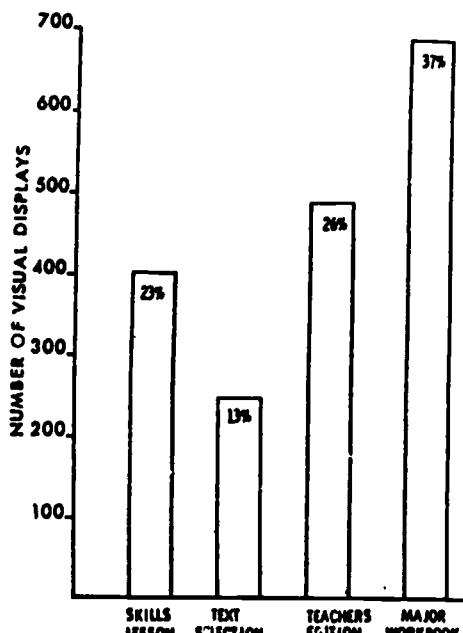
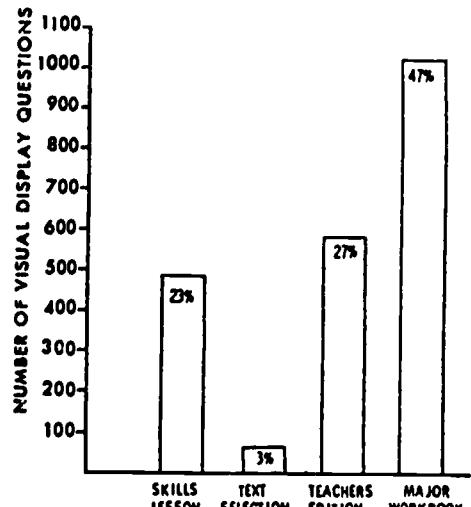


FIGURE 1B
LOCATION OF VISUAL DISPLAY QUESTIONS



2

2

FIGURE 4 A

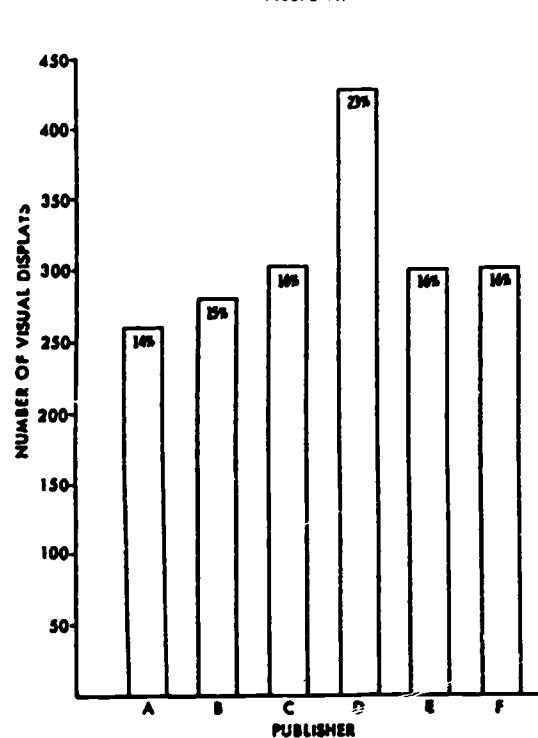


FIGURE 4 B

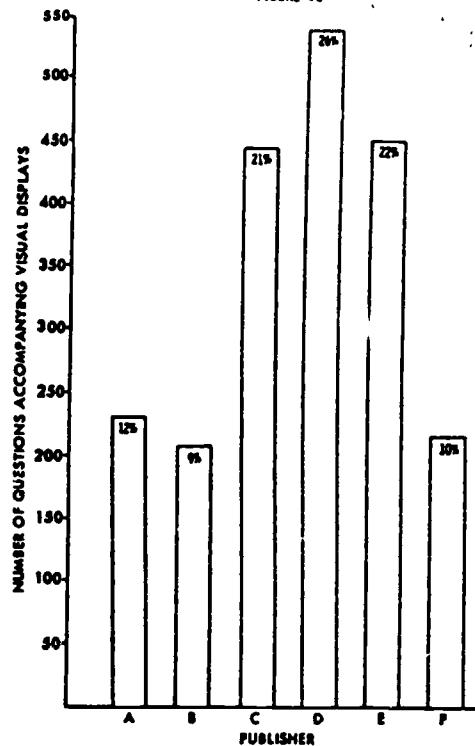


FIGURE 6 A

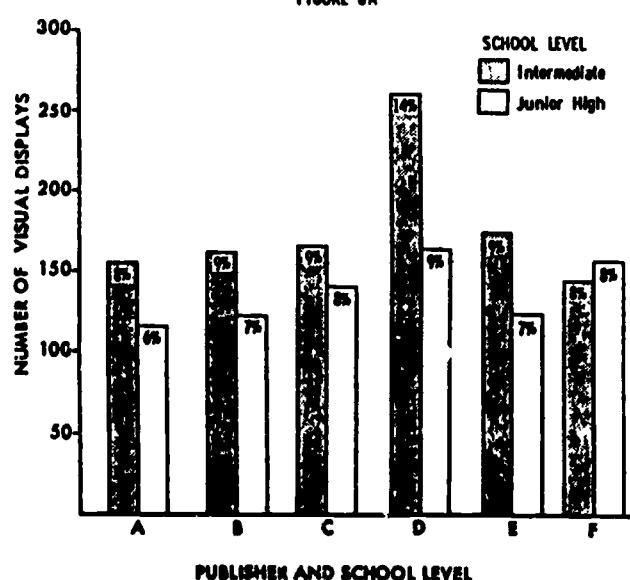


FIGURE 6 B

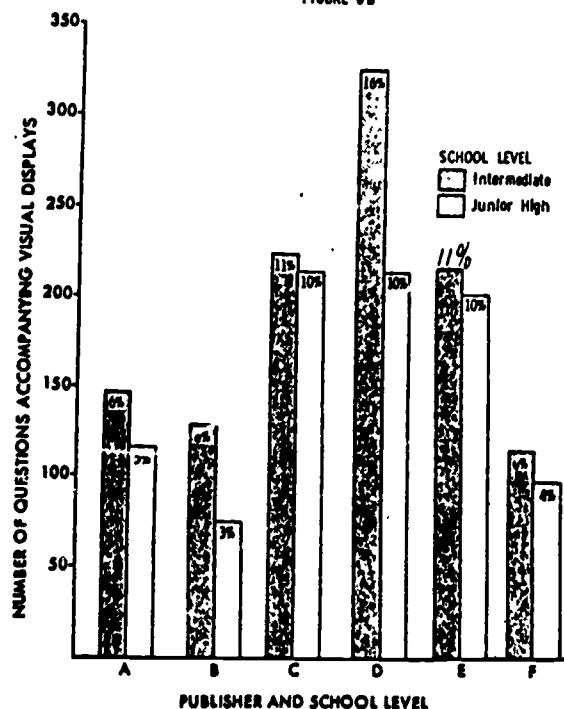


TABLE 1A

DISTRIBUTION OF VISUAL DISPLAYS FOR STUDENT AND TEACHER BASAL MATERIAL LOCATIONS ACROSS PUBLISHERS AND SCHOOL LEVELS (Grades 4-6 and 7-8)

<u>Location</u>	<u>Number</u>	<u>% Of Total</u>	<u>Avg. Per Publisher</u>	<u>Avg. Per Grade</u>
<u>Student Materials</u>				
<u>Textbook Total</u>	705	37%	141	28
Skills Lessons	440	23%	88	18
Text Selection	247	(3%)	49	10
Checkpoint	18	1%	4	--
<u>Major Workbook</u>	689	37%	138	28
	—	—	—	—
<u>Total Student Material</u>	1394	74%	279	56
<u>Teacher Materials</u>				
<u>Teacher's Edition</u>	490	(26%)	98	20
	—	—	—	—
<u>GRAND TOTAL</u>	1884	100%	377	76

TABLE 4A

LOCATION OF TOTAL QUESTIONS ACCOMPANYING VISUAL DISPLAYS ACROSS PUBLISHERS AND SCHOOL LEVELS (INTERMEDIATE, GRADES 4-6 AND JUNIOR HIGH GRADES 7-8)

<u>LOCATION</u>	<u>NUMBER</u>	<u>% OF TOTAL</u>	<u>AV. PER PUBLISHER</u>	<u>GRADE</u>
<u>Student Materials</u>				
<u>Textbook Total</u>	558	26%	93	19
Skills Lessons	493	23%	82	16
Text Selection	65	(3%)	11	2
<u>Major Workbook</u>	1026	47%	171	34
<u>Total Student Material</u>	1584	73%	264	53
<u>Teacher Materials</u>				
<u>Teacher Edition</u>	592	(27%)	99	20
	—	—	—	—
<u>GRAND TOTAL</u>	2176	100%	363	73

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TABLE 2A

DISTRIBUTION OF VISUAL DISPLAYS FOR STUDENT AND TEACHER BASAL MATERIAL LOCATION FOR INTERMEDIATE (GRADES 4-6) AND JUNIOR HIGH (GRADES 7-8) LEVELS ACROSS PUBLISHERS

Location	Total	Numbers	% of Total		Avg. Per Pub.		Avg. Per Grade		
		Int.	Jr. High	Int.	Jr. High	Int.	Jr. High	Int.	Jr. High
<u>Student Materials</u>									
Textbook Total	705	365	340	36%	41%	61	57	12	11
Skills Lesson	440	205	235	19%	29%	34	39	7	8
Text Selections	247	149	98	14%	12%	25	16	5	3
Checkpoint	18	11	7	1%	--	--	--	--	--
Major Workbook	689	402	287	38%	35%	67	48	10	10
Total Student Material	1394	767	625	72%	76%	128	104	26	21
<u>Teacher Materials</u>									
Teachers Edition	490	293	197	28%	24%	49	33	10	67
GRAND TOTAL	1884	1060	824	100%	100%	177	137	35	27

TABLE 3A

NUMBER AND %* OF VISUAL DISPLAYS FOR 6 PUBLISHERS, 5 LOCATIONS, AND 2 SCHOOL LEVELS--INTERMEDIATE (GRADES 4-6) AND JUNIOR HIGH (GRADES 7-8)

Location School Level	Publisher										TOTAL	
	A No.	A %	B No.	B %	C No.	C %	D No.	D %	E No.	E %		
Major Workbook												
Int.	49	12%	49	12%	74	19%	130	32%	46	12%	54	13%
Jr. High	45	16%	37	13%	53	19%	82	79%	27	9%	43	15%
Teacher's Edition												
Int.	48	16%	30	10%	39	13%	57	20%	78	27%	41	14%
Jr. High	31	16%	10	5%	41	21%	2	1%	66	34%	47	24%
Skills Lesson												
Int.	27	13%	46	22%	42	21%	46	22%	17	8%	27	13%
Jr. High	34	15%	43	18%	41	17%	56	24%	22	9%	39	17%
Text Selection												
Int.	24	15%	35	24%	10	7%	32	22%	31	21%	18	12%
Jr. High	4	4%	34	35%	8	8%	22	22%	10	10%	20	20%
Checkpoint												
Int.	5	54%	--	--	--	--	--	--	--	6	56%	
Jr. High	--	--	--	--	--	--	--	--	--	7	100%	
Total												
Int.	152	14%	160	15%	165	16%	265	25%	172	15%	146	14%
Jr. High	114	14%	124	15%	143	17%	162	20%	125	15%	156	18%
GRAND TOTAL AV.	266	14%	284	15%	308	16%	427	23%	297	16%	302	16%
											1884	100%

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ANOVA MAIN EFFECTS

TABLE 38
ANALYSIS OF VARIANCE FOR MAIN EFFECT OF LOCATION: QUESTIONS

Variable: Question Type	DF	F Value	Significance of F
Total Questions	4	77.87	.001
Extracting Data	4	37.15	.001
Comparing Data	4	23.67	.001
Evaluating Data	4	3.07	.02

TABLE 28
ANALYSIS OF VARIANCE FOR MAIN EFFECT OF PUBLISHER: QUESTIONS

Variable Question Type	DF	F Value	Significance of F
Total Questions	5	27.52	.001
Extracting Data	5	7.92	.001
Comparing Data	5	2.99	.011
Manipulating Data	5	4.16	.001
Evaluating Data	5	8.72	.001

TABLE 18
ANALYSIS OF VARIANCE FOR MAIN EFFECTS OF PUBLISHER: ENRICHMENT ACTIVITIES

Variable	DF	F Value	Significance of F
Enrichment Activities	5	13.38	.001

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ANOVA INTERACTIONS

TABLE 14

ANALYSIS OF VARIANCE FOR PUBLISHER AND LOCATION 2-WAY INTERACTION: QUESTIONS

Variable: Question Type	DF	F Value	Significance of F
Total Questions	14	9.92	.001
Extracting Data	13	3.25	.001
Manipulating Data	8	3.43	.001
Evaluating Data	11	2.08	.02

TABLE 15

ANALYSIS OF VARIANCE FOR SCHOOL LEVEL X LOCATION 2-WAY INTERACTION: QUESTIONS

Variable: Question Type	DF	F Value	Significance of F
Total Questions	4	11.72	.001

TABLE 13

2-WAY

ANALYSIS OF VARIANCE FOR PUBLISHER AND SCHOOL LEVEL INTERACTION: QUESTIONS

Variable: Question Type	DF	F Value	Significance of F
Total Questions	5	4.88	.001
Extracting Data	5	2.84	.015
Interpreting Data	5	2.73	.02

TABLE 16

ANALYSIS OF VARIANCE FOR PUBLISHER, SCHOOL LEVEL, LOCATION 3-WAY INTERACTION: QUESTIONS

Variable: Question Type	DF	F Value	Significance of F
Total Questions	11	4.13	.001

MARGINAL CELL MEANS

TABLE 18
MEAN NUMBER OF PUBLISHERS' QUESTIONS PER PAGE FOR QUESTION TYPES

Variable Question Type	Pub. A	Pub. B	Pub. C	Pub. D	Pub. E	Pub. F	Average Over all Publishers
Total Questions	6.43 (3.74)	4.81 (2.78)	8.86 (6.69)	7.08 (4.43)	5.97 (3.72)	5.37 (2.29)	6.72 (4.64)
1 Extracting Data	4.96 (3.63)	4.71 (2.90)	5.75 (4.76)	5.28 (4.71)	3.44 (2.77)	3.96 (2.59)	4.84 (4.07)
2 Comparing Data	3.74 (3.10)	3.45 (2.15)	5.19 (5.35)	4.43 (3.97)	3.63 (3.51)	4.04 (2.65)	4.22 (3.93)
5 Manipulating Data	2.57 (1.34)	1.15 (.38)	2.71 (2.07)	1.77 (.99)	1.90 (1.26)	2.33 (1.54)	2.10 (1.50)
3 Interpreting Data	2.26 (1.73)	1.80 (1.23)	3.38 (2.87)	2.33 (.82)	2.23 (1.90)	2.79 (2.51)	2.58 (2.28)
4 Evaluating Data	2.88 (1.64)	2.76 (2.22)	3.97 (2.60)	2.57 (1.54)	1.32 (.61)	2.03 (1.66)	2.54 (1.96)

*Standard Deviations are in Parentheses

TABLE 5
MEAN NUMBER OF TOTAL QUESTIONS PER PAGE FOR PUBLISHERS AND SCHOOL LEVEL*

Variable School Level	Publisher A	Publisher B	Publisher C	Publisher D	Publisher E	Publisher F
Intermediate	5.29 (1.81)	4.86 (2.70)	9.81 (7.41)	6.75 (4.17)	6.23 (3.78)	5.31 (2.03)
Junior High	7.79 (4.86)	4.73 (2.81)	7.81 (5.69)	7.49 (4.81)	5.69 (3.67)	5.82 (2.58)

*Standard Deviations are in Parentheses

TABLE 4B
MEAN NUMBER OF TOTAL QUESTIONS PER PAGE FOR PUBLISHER, LOCATION AND SCHOOL LEVEL*

Variable	Publisher A	Publisher B	Publisher C	Publisher D	Publisher E	Publisher F				
Location	INT	JH	INT	JH	INT	JH	INT	JH	INT	JH
Skills Lesson	5.64 (2.12)	6.08 (3.20)	3.10 (1.75)	2.14 (.95)	4.15 (2.92)	2.70 (.92)	3.56 (1.85)	4.44 (2.89)	5.31 (2.21)	6.79 (4.83)
Text Selection	---	---	1.17 (.98)	1.86 (1.07)	---	---	4.80 (2.65)	5.90 (2.73)	4.50 (4.95)	10.00 (0)
Teacher's Manual	4.87 (1.60)	3.75 (3.28)	4.61 (1.67)	4.43 (1.51)	14.89 (11.10)	6.79 (2.33)	5.38 (2.66)	3.00 (1.41)	5.07 (2.24)	4.40 (2.20)
Workbook	5.40 (1.58)	9.95 (5.00)	6.56 (2.63)	6.63 (2.32)	10.41 (5.15)	12.48 (5.41)	8.40 (4.48)	9.64 (4.86)	8.37 (4.97)	7.92 (4.33)

Standard Deviations are in Parentheses

TABLE 48 (continued)

MEAN NUMBER OF EXTRACTING DATA QUESTIONS PER PAGE FOR PUBLISHER, LOCATION AND SCHOOL LEVEL*

Variable	Publisher A		Publisher B		Publisher C		Publisher D		Publisher E		Publisher F		TOT
Location	INT	JH	INT	JH	INT	JH	INT	JH	INT	JH	INT	JH	
3 Skills Lesson	3.78 (2.67)	4.72 (3.21)	2.70 (1.57)	2.33 (1.03)	3.00 (2.81)	1.64 (.87)	5.49 (4.96)	3.55 (2.63)	3.36 (2.46)	5.46 (4.05)	3.20 (2.49)	5.00 (0)	3.6
4 Text Selection	---	1.00 (0)	2.00 (0)	3.00 (1.41)	---	---	4.50 (3.25)	3.48 (12.13)	5.00 (0)	3.48 (12.13)	---	---	1.87
2 Teacher's Manual	2.90 (1.30)	4.50 (2.12)	3.30 (1.42)	4.00 (3.16)	5.82 (2.44)	5.72 (2.28)	3.40 (2.30)	1.00 (0)	9.76 (0)	2.07 (1.56)	2.67 (1.63)	2.00 (0)	3.92
1 Workbook	4.54 (1.69)	7.33 (5.17)	6.32 (3.06)	5.50 (2.80)	8.69 (5.74)	7.21 (5.14)	6.56 (5.57)	6.89 (5.44)	5.52 (3.65)	4.07 (3.26)	3.40 (2.50)	4.87 (3.11)	5.91

*Standard Deviations are in parentheses

MEAN NUMBER OF COMPARING DATA QUESTIONS PER PAGE FOR PUBLISHER, LOCATION AND SCHOOL LEVEL*

Variable	Publisher A		Publisher B		Publisher C		Publisher D		Publisher E		Publisher F		
Location	INT	JH	TOT										
3 Skills Lesson	2.36 (2.34)	3.39 (1.85)	2.27 (.90)	1.00 (0)	3.00 (2.21)	1.33 (.48)	2.79 (1.76)	2.00 (1.33)	3.33 (1.75)	2.89 (1.97)	3.64 (2.11)	2.67 (1.50)	2.56
4 Text Selection	---	---	1.67 (.52)	---	---	---	2.10 (1.73)	4.00 (1.41)	3.00 (0)	10.00 (0)	---	---	1.73
2 Teacher's Manual	2.67 (1.21)	3.50 (3.73)	3.50 (2.14)	---	5.50 (2.26)	3.33 (1.35)	2.47 (2.42)	3.00 (0)	2.76 (1.79)	2.39 (1.59)	1.75 (.50)	2.00 (0)	2.74
1 Workbook	3.31 (1.70)	5.25 (4.41)	4.05 (2.48)	4.75 (1.96)	6.51 (6.20)	7.44 (6.97)	4.91 (3.40)	6.49 (5.81)	5.11 (5.73)	5.26 (3.49)	4.86 (2.46)	5.00 (3.29)	4.41

*Standard Deviations are in parentheses

MEAN NUMBER OF MANIPULATING DATA QUESTIONS PER PAGE FOR PUBLISHER, LOCATION AND SCHOOL LEVEL*

Variable	Publisher A		Publisher B		Publisher C		Publisher D		Publisher E		Publisher F		
Location	INT	JH	INT	JH	INT	JH	INT	JH	INT	JH	INT	JH	TOT
2 Skills Lesson	---	1.25 (.50)	1.33 (.58)	---	1.00 (0)	1.00 (0)	2.00 (0)	1.43 (.79)	1.00 (0)	3.00 (2.68)	1.67 (1.15)	3.75 (1.89)	1.45
4 Text Selection	---	---	1.00 (0)	---	---	---	1.67 (.58)	---	---	---	---	---	1.14
3 Teacher's Manual	---	---	---	2.00 (0)	4.00 (2.25)	2.33 (2.30)	1.25 (.50)	---	1.62 (.96)	1.80 (.89)	---	---	1.09
1 Workbook	2.33 (1.53)	3.42 (.98)	1.00 (0)	1.00 (0)	1.50 (.55)	2.75 (2.02)	2.30 (1.42)	1.74 (.87)	1.93 (1.27)	2.00 (.70)	1.67 (.81)	1.80	

*Standard Deviations are in Parentheses

TABLE 48 (continued)
MEAN NUMBER OF EVALUATING DATA QUESTIONS PER PAGE FOR PUBLISHER, LOCATION AND SCHOOL LEVEL*

Variable	Publisher A		Publisher B		Publisher C		Publisher D		Publisher E		Publisher F	
Location	INT	JH	INT	JH	INT	JH	INT	JH	INT	JH	INT	JH
3 Skills Lesson	3.25 (1.54)	---	2.08 (1.56)	1.75 (.89)	1.00 (0)	---	2.00 (0)	1.33 (.58)	1.67 (1.03)	1.67 (.58)	1.00 (0)	1.00 (0)
4 Text Selection	---	---	---	1.20 (.45)	---	---	2.00 (1.00)	2.00 (1.41)	1.00 (0)	---	---	---
2 Teacher's Manual	2.88 (1.64)	---	3.00 (2.83)	4.50 (3.54)	4.75 (2.21)	3.17 (2.04)	3.56 (1.67)	2.00 (0)	1.13 (.35)	1.29 (.61)	---	---
1 Workbook	2.71 (1.77)	1.00 (0)	5.67 (2.08)	4.29 (2.75)	1.00 (0)	4.14 (3.58)	3.00 (2.08)	2.00 (.82)	1.00 (0)	2.00 (0)	2.21 (1.53)	4.00 (2.24)
												Tot
												1.38 0.52 2.10 2.75

*Standard Deviations are in parentheses

TABLE 17
MEAN NUMBER OF ENRICHMENT ACTIVITIES PER PAGE FOR PUBLISHER

Variable	Publisher A	Publisher B	Publisher C	Publisher D	Publisher E	Publisher F	Overall Publishers
Enrichment Activities	.42 (.12)	.24 (.87)	.30 (1.02)	.10 (.36)	.02 (.12)	.09 (.34)	.18 (.72)

*Standard Deviations are in Parentheses

TABLE 19
MEAN NUMBER OF ENRICHMENT ACTIVITIES FOR PUBLISHERS AND SCHOOL LEVEL

Variable School Level	Publisher A	Publisher B	Publisher C	Publisher D	Publisher E	Publisher F
Intermediate	.51 (1.38)	.20 (.88)	.36 (1.20)	.10 (.36)	.02 (.15)	.12 (.37)
Junior High	.31 (.64)	.66 (1.27)	.41 (.97)	.32 (.60)	.01 (.01)	.06 (.31)

*Standard Deviations are in Parentheses

TABLE 6
MEAN NUMBER OF EXTRACTING DATA QUESTIONS PER PAGE FOR PUBLISHERS AND SCHOOLS*

Variable School Level	Publisher A	Publisher B	Publisher C	Publisher D	Publisher E	Publisher F
Intermediate	3.78 (2.67)	4.88 (3.00)	6.68 (5.16)	5.20 (4.75)	3.71 (2.74)	3.57 (2.34)
Junior High	5.92 (4.18)	4.43 (2.75)	4.72 (4.05)	5.61 (4.67)	3.05 (2.79)	4.64 (2.91)

*Standard Deviations are in Parentheses

TABLE 7
MEAN NUMBER OF COMPARING DATA QUESTIONS PER PAGE FOR PUBLISHER AND SCHOOL LEVEL*

Variable School Level	Publisher A	Publisher B	Publisher C	Publisher D	Publisher E	Publisher F
Intermediate	2.88 (1.87)	3.20 (2.12)	5.43 (4.88)	4.13 (3.09)	3.71 (3.95)	4.10 (2.35)
Junior High	4.33 (3.62)	4.19 (2.13)	4.97 (5.78)	4.90 (5.09)	3.52 (2.84)	4.00 (2.97)

*Standard Deviations are in Parentheses

TABLE 8
MEAN NUMBER OF MANIPULATING DATA QUESTIONS PER PAGE FOR PUBLISHER AND SCHOOL LEVEL

Variable School Level	Publisher A	Publisher B	Publisher C	Publisher D	Publisher E	Publisher F
Intermediate	2.33 (1.53)	1.10 (.32)	2.87 (2.20)	1.94 (1.16)	1.72 (1.10)	1.67 (1.15)
Junior High	2.64 (1.36)	1.33 (.58)	2.56 (1.98)	1.65 (.85)	2.06 (1.39)	2.50 (1.62)

*Standard Deviations are in Parentheses

TABLE 10
MEAN NUMBER OF EVALUATING DATA QUESTIONS PER PAGE FOR PUBLISHER AND SCHOOL*

Variable School Level	Publisher A	Publisher B	Publisher C	Publisher D	Publisher E	Publisher F
Intermediate	2.94 (1.63)	2.84 (2.24)	4.16 (2.46)	2.95 (1.76)	1.26 (.82)	1.89 (1.41)
Junior High	1.00 (0)	2.60 (2.25)	1.63 (2.90)	1.80 (.79)	1.39 (.61)	2.25 (2.05)

*Standard Deviations are in Parentheses